

Topic: N17A-T001

Ultimara

Electro-Optic Transmissive Scanner

The goal of this project is to develop and construct a thin, lightweight, low power, large aperture, electro-optic (EO) transmissive scanner that utilizes an EO active nano-material phase wavefront control, suitable for unmanned aerial vehicle (UAV) platforms. This nano-material beam-steering technology large aperture system offers an ultra-low Size, Weight, and Power (SWaP) scanner that fits on UAV's airframe and achieves ultrafast and wide scanning angles with diffraction limited beam quality. Ultimara seeks to partner with UAV prime contractors to integrate and demonstrate its lightweight, low cost, high performance, laser beam steering technology.

Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

Fixed Wing Vehicles (includes UAS)

Unmanned Ground and Sea Vehicles

Electro-Optical/Infrared (EO/IR)

Sensors, Electronics and Photonics

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<https://www.ultimara.com/>

SYSCOM: NAVAIR

Contract: N68335-19-C-0150

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0150

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2019-877

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WHO

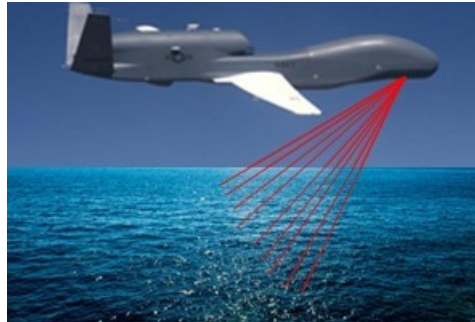
SYSCOM: NAVAIR

Sponsoring Program: NAVAIR UAV program offices

Transition Target: Unmanned Aerial Vehicles (UAV), tasked to perform E/O Intelligence, Surveillance, and Reconnaissance (ISR), search and rescue, and automated target recognition (ATR) missions

TPOC:
(301)342-2034

Other transition opportunities:
Office of Naval Research Code 32,
Ocean Battlespace and Expeditionary
Access, Future Naval Capability



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WHAT

Operational Need and Improvement: Existing gimbals laser beam steering devices are bulky, heavy, low speed, and cannot be integrated on lightweight unmanned aerial vehicles (UAVs). The goal of this program is to develop and fabricate an ultra-low Size, Weight, and Power (SWaP) integrated electro-optic transmissive scanner technology that leverages novel nano-materials to achieve very wide scanning angles with diffraction-limited beam quality.

Specifications Required: Lightweight (<1lb); fast scanning speed (>MHz); large field of view 90 degrees; single common transmit and receive aperture; no aerodynamic drag to UAV; low cost; and low power.

Technology Developed: Ultimara's innovative scalable electro-optic transmissive scanner design can steer efficiently the optical beam over a wide-angle range >45 degrees, while being ultra-fast, compact and power-efficient, with very low loss to the laser beam. Key capabilities include ultra-fast multi-target acquisition and tracking. One unique feature of this product architecture is the ability to transmit and receive from a common aperture.

Warfighter Value: Ultimara's electro-optic transmissive scanner will be integrated on miniature UAVs. The proposed product is expected to alleviate the problems associated with slow steering speed, large size and weight of present-day beam steering devices. The anticipated development of an integrated electro-optic beam steering concept will be of immediate use where conventional beam steering devices have been prohibited by, size, integration, weight, vibration, power consumption and steering speed.

WHEN

Contract Number: N68335-19-C-0150 **Ending on:** December 17, 2021

| Milestone | Risk Level | Measure of Success | Ending TRL | Date |
|---------------------------------------|------------|--|------------|---------------|
| Beam scanning design optimization | N/A | Demonstrate scanning | NA | TBD |
| Beam scanner performance testing | Med | Acceptable test measurement | 3 | TBD |
| Beam scanner performance test | Med | Meet target specification | 4 | TBD |
| Prototype qualification | Med | Deliver to the Navy for acceptance testing | 7 | December 2020 |
| Prototype Optimization, Phil option 1 | Med | Deliver to the Navy | 9 | December 2021 |

HOW

Projected Business Model: Ultimara will work with the developers of UAVs to integrate its technology into a specific platform. Once integrated, Ultimara will produce units to support this class of UAV large aperture EO sensor requirements. Commercial applications are driven by the need for compact, flexible, low weight electro-optic beam steering for EO sensors applications. Ultimara is a pioneer of novel electro-optic (EO) phased array transmitters/receivers and laser beam wavefront control. Ultimara is building the beam steering aperture.

Company Objectives: Ultimara is looking to work with the developers of UAVs to integrate and demonstrate our lightweight, low cost, high performance, laser beam steering technology into various classes of UAVs.

Potential Commercial Applications: Ultimara's technology will support next-generation UAVs with integrated electro-optic (EO) large aperture modular multi-function sensors for multi-target tracking, free-space communication, etc. The availability of optical phased array transmitters and receivers would be used to replace ball gimballed surveillance systems widely used by the military and law enforcement. It would enable new consumer products such as digital cameras with new electronic scanning and focusing capabilities, miniature movie projectors, helmet-mounted displays, and display products of various types including low-cost projection televisions.

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